

COOPERATIVE EXTENSION



Washington State University

ENERGY PROGRAM

Professional Training Opportunities

The Washington State University Cooperative Extension Energy Program (WSU EP) staff are available to provide residential forced air heating system training.

WSU EP has developed specific training for utility conservation staff, HVAC contractors, code officials, and the building design community. Presentations range from short introductory talks, to an extensive installer training and certification program.

Utility Program Support:

WSU EP has developed a residential HVAC training course. The curriculum includes: an overview of current industry practices; duct leakage impacts on health, safety, comfort, and energy efficiency; and a systems approach for retrofit sealing and improved design and installation of new systems. The course offers proven diagnostic techniques combined with retrofit and new construction solutions based on sound building science.

This course has evolved over the last three years as it has been successfully offered to numerous utilities and shown proven value for program support and staff development.

Residential HVAC Installer Training:

The installer training course emphasizes the HVAC systems physical interactions with the rest of the structure. System interactions which effect health and safety as well as energy efficiency are examined. The program includes cost effective solutions for new construction problems as well as diagnosis and repair techniques for existing homes. The training is

the basis for an installer certification program to assure quality and value in the marketplace.

Code Enforcement:

The HVAC industry is a very competitive market. Frequently, the only quality control is the enforcement of minimum code requirements.

WSU EP has worked with the State's ICBO chapters to upgrade residential HVAC inspections.

Building Design:

Moving the ducts indoors can increase heating and cooling system efficiency by 25 percent, at no additional cost. The additional cost of soffits used to conceal duct in interior spaces is offset by lower HVAC installation cost. By designing spaces for HVAC systems inside the thermal envelope, architects can provide significant value to their customers.

WSU EP has conducted training for architects, designers, and builders interested in learning more about systems approaches to HVAC installation.

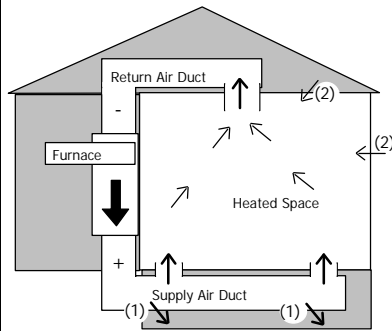
Reports Available:

RCDP IV Final Report : Improved Air Distribution Systems for Forced-Air Heating.
Bonneville Power Administration, July 1995.

Describes the results of demonstration projects. New construction as well as retrofit work is included. Includes performance and cost information.

The Problem with Forced Air Heating Systems

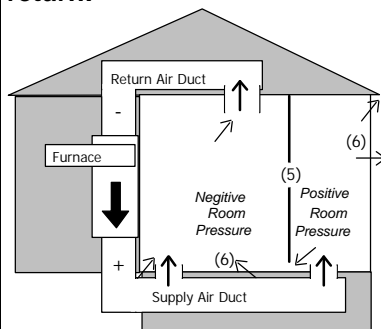
Supply Duct Leaks:



High pressures in the supply side of the heating system forces heated air through small holes in the duct system. (1)

Every cubic foot of air that leaves the heated space of the home through the leaks in the supply must be replaced by an equal amount of make up air from other areas. This air could come from the outdoors, or from the buffer spaces such as the crawl space, attic or garage. (2)

Closed doors separate supply air from the return:



Most contemporary homes are built with one or two return registers located in the living room or halls. When doors to the bedrooms are closed the supply air is not allowed to freely flow back to the return. (5) This induces a positive pressure in the room with only a supply duct, and a negative pressure in the large common area where the return duct grill is located. This can significantly increase the movement of air in and out of the heated space through holes in the building. (6)

Heating System Impacts

Poor system design and installation can have significant impacts on a home. Duct leakage, inadequate return systems, and poor attention to details cause a variety of problems.

Safety

Poorly installed duct work can cause wood fireplaces or gas appliances to backdraft. Leaking supply ducts have the effect of a large exhaust fan. Supply leaks depressurize the structure and pull combustion byproducts into the home. Inadequate return systems can have the same effect.

Indoor Air Quality

Poorly installed duct systems increase the ventilation rate of the structure. Unlike controlled ventilation strategies, there is no telling where the make up air is coming from. Poorly installed ductwork will frequently pull air from the garage, attic or crawl space. No one would recommend these sources for make up air.

Energy Efficiency

On average, 29 percent of a forced air heating systems energy is lost to the outdoors. This is caused by direct duct leaks to the outdoors, increased infiltration through the shell because of poor system design, and increased conduction because of poor duct insulation. System capacity is reduced, and peak load requirements are increased.

For More Information:

David Hales, WSU CEEP
222 N. Havana St. Suite 204
Spokane, WA 99202

Phone: 509-477-6702
Fax: 509-477-6709
E-mail: halesd@energy.wsu.edu